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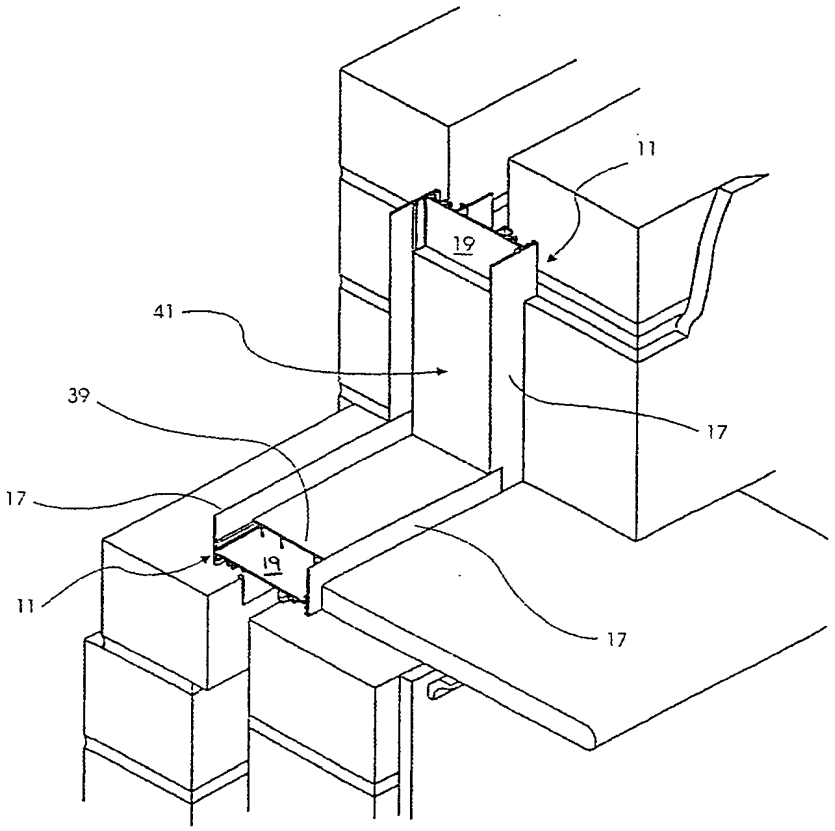
(54) Title: CONSTRUCTION SYSTEM AND FRAMES THEREFOR FOR GLASS BLOCK WALLS




(57) Abstract: A construction system for block walls comprising a rectangular frame including corresponding head, sill and jamb frame sections (11) that may be interconnected to form the frame within which the blocks may be laid in a rectangular matrix spaced by interstitial connectors or spacers and interconnected by a binder, the frame sections (11) having a block engaging portion (13) comprising a channel section having a pair of flanges (17) provided on opposed sides of the block engaging portion thereof and an interconnecting transverse web portion (19), the pair of flanges (17) being spaced apart a distance sufficient to accommodate the transverse extent of a block seated therebetween in an endwise position.

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# "Construction System and Frames Therefor for Glass Block Walls"

## Field of the Invention

This invention relates to a construction system and frames therefor for block walls. The invention has particular utility in the construction of glass block walls, but is not limited to walls constructed of such blocks, whereby the invention may also have utility in walls constructed from other types of blocks.

Throughout the specification, unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

## Background Art

In the art of block wall construction, it is known to construct a glass block wall by laying glass blocks positioned in rows and columns to form a rectangular matrix. The glass blocks are precisely located and spaced apart with the aid of interstitial connector or spacer members and a binder is laid or inserted into the spaces or gaps between the blocks to bind them together to form the matrix.

An example of constructing a glass block wall with a connector member particularly suited for using a mortar binder is described in Australian Patent 608220 in the name of Emil Meyer. Using connector members of this kind allows for the regular spacing of glass blocks and the rapid construction of a wall matrix comprising the same. However, as with the construction of all block wall systems, the efficacy of this type of construction technique is very dependent upon the accurate and precise positioning of the foundation layer of the first row of glass blocks.

Accordingly, the inventors of the present invention developed a construction system for glass block walls utilising a peripheral rectangular frame to facilitate the precise and accurate positioning of the foundation layer of glass blocks and the subsequent laying of glass blocks within the frame to complete the construction of the wall. An example of this type of construction system using a spacer particularly suited for use with a silicon binder is described in Australian Patent 680088 in the name of the present applicants.

As shown in Figures 1A to 1E of the accompanying drawings, the rectangular frame used in the aforementioned construction system comprises a sill frame section 11', a pair of jamb frame sections 13' and a head frame section 15'. Each of these frame sections is of a prescribed length to accommodate the requisite number of rows and columns forming the glass block wall matrix.

All of the frame sections have a block-engaging portion in the form of a channel section 17'. This channel section comprises a transverse web portion 19' and a pair of laterally spaced apart and longitudinally extending flanges 21' defining the opposed sides of the frame section. These flanges 21' are coextensive and are spaced apart a distance that is marginally greater than the width of a glass block 23' so that a glass block may sit snugly within the channel section 17' in an end-wise position.

Due to: (i) the location in which a glass block wall is desired to be constructed, eg stand alone or part of an existing wall structure; (ii) the nature of the surround in which a glass block wall is desired to be constructed, eg a cavity brick wall (Figs 1A to 1E), single brick wall, veneer wall, stud wall etc; and/or (iii) the particular laying system employed with the glass blocks 23'; these frames have been typically made with marginally different configurations in section. Moreover, the jamb frame sections 13' have been of corresponding configuration, but the sill and head frame sections 11' and 15' respectively, in the main, have been of a different configuration.

The major difference in these two types of configuration of the channel section 17' between the various frame sections used is in the length of the flanges 21'.

Moreover, the coextensive flanges 21'a of the jamb frame sections are of a magnitude longer than the coextensive flanges 21'b and 21'c of the head and sill frame sections respectively that are typically used.

This difference in the flange lengths comes about principally due to the different laying techniques employed to provide gaps 25' between the ends of a terminal row or column of glass blocks 23' in the matrix and the confronting web portion 19' of the channel section 17' of each frame. These gaps 25' are included to accommodate the different rates of thermal contraction and expansion of the glass blocks 23' relative to the rectangular frame, or relative movement between the two arising from other causes affecting the foundations of the building structure, e.g. earthquakes.

In the case of the jamb frame sections 13'(Fig 1D), this gap 25'a is filled with a deformable infill member 27' such as polystyrene foam, which has a degree of resiliency to accommodate the relative movement between a terminating glass block 23' and the frame without creating cracks in the binder interconnecting the glass blocks, as well as an end interstitial connector or spacer member 29'. Thus the length of the flanges 21'a needs to be sufficient to conceal both the infill member 27' and the spacer member 29' and to provide a seat for the ends of the terminating glass blocks to repose within.

However, with respect to the head and sill frame sections 15' and 11' (Fig 1B and Fig 1C), the corresponding gaps 25'b and 25'c, respectively, do not have to be filled with an infill member. Further, in the case of the head frame section 15', the gap 25'b thereof doesn't need to accommodate an end interstitial spacer member at all, although in practice it is still desirable to include such. Thus the length of the flanges 21'b and 21'c thereof are less than the length of the flanges 21'a of the jamb frame section 13', since they only need to conceal an end interstitial spacer member 29', and then in the case of the head frame section 15', only if it is used, and not a deformable infill member.

Given the above laying technique, from a manufacturing perspective, the frame sections are reduced down to two basic configurations, one configuration being

Preferably, the deformable infill member is formed of polystyrene foam and is retained in position by said retaining nodules.

Preferably, there is provided a flush fill member for closing the channel section of a frame section.

Preferably, the flush fill member is itself a channel section having a pair of legs and an interconnecting web portion of commensurate transverse extent to the channel section of a frame section.

Preferably, the flush fill member has clips disposed at the distal ends of the legs thereof to engage and be positively retained by the retaining nodules provided on the inner side of the flanges of the frame section to close the channel section thereof.

Preferably, the flush fill member has a spacing nodule provided on the outer face of each of the legs at the proximal ends thereof to positively engage and support the legs within the confines of the channel section of the frame section against the flanges thereof.

In accordance with another aspect of the present invention, there is provided an improved construction system for block walls including a rectangular frame having a head, sill and a pair of jamb frame sections that may be interconnected to form the frame within which the blocks may be laid in a rectangular matrix spaced by interstitial connectors or spacers and interconnected by a binder, the frame sections including a block engaging portion comprising a channel section having a pair of flanges provided on opposed sides of the block engaging portion thereof and an interconnecting transverse web portion, the pair of flanges being spaced apart a distance sufficient to accommodate the transverse extent of a block seated therebetween in an endwise position;

the improvement comprising:

each of the head, sill and jamb frame sections being of a basic common configuration;

wherein the flanges of all frame sections are of the same length and are sufficiently long to accommodate and conceal both an infill member and an interstitial end connector or spacer of a prescribed thickness for spacing the confronting end of a terminating block from the web portion of the frame section.

In accordance with a further aspect of the invention, there is provided a method for forming a block wall matrix, comprising:

interconnecting and mounting a head, sill and a pair of jamb frame sections to form a rectangular frame, the frame sections all being of corresponding shape and having a block engaging portion disposed inwardly of the frame to accommodate the laying of blocks therein to form a block wall matrix, the block engaging portion comprising a channel section having a pair of flanges and an interconnecting transverse web portion, the pair of flanges being spaced apart a distance sufficient to accommodate the transverse extent of a block seated therebetween in an endwise position and of a length sufficient to accommodate and conceal both an infill member and an interstitial end connector or spacer, both of prescribed thicknesses, for spacing the confronting end of a terminating block from the web portion of the frame section;

locating a rigid infill member within the channel section on which a block may sit and be retained within the frame endwise, the rigid infill member comprising a transverse web portion and a plurality of laterally spaced, longitudinally extending legs that depend from one side of the web portion co-extensively, intermediate the opposing longitudinal edges of the web portion;

locating deformable infill members in the channel sections of each jamb frame section and pressing them into juxtaposition against the transverse web portions of each channel section, past the retaining nodules of the flanges so that the retaining nodules positively retain the deformable infill members in position;

laying the foundation blocks along the rigid infill member within the sill frame section with the interstitial end connectors or spacers and binder as appropriate to accurately and precisely accommodate the entire length of the channel section between the deformable infill members reposing at either end of the sill frame section, within the jamb frame sections, so that the confronting ends of the terminating blocks at either end of the foundation layer indirectly engage the deformable infill members via end interstitial connectors or spacers disposed thereon;

successively laying rows of blocks on the foundation layer with interstitial connectors or spacers and binder as appropriate to maintain the accurate and precise positioning of the blocks to form a rectangular matrix, the confronting ends of the terminating blocks at either end of these rows continuing to indirectly engage the deformable infill members via end interstitial connectors or spacers disposed thereon; and

laying the final uppermost row of terminating blocks so that the last block to insert is intermediate the terminating blocks at either end of the row, whereby the uppermost confronting ends of the terminating blocks are disposed marginally within the channel section of the head frame sections to be retained between the flanges and spaced from the web portion thereof to leave a gap without any deformable infill member being disposed therein, the gap allowing for convenient manoeuvring of the terminating blocks for correct positioning thereof upon the preceding row.

In accordance with a further aspect of the present invention, there is provided a frame section, rigid infill member or deformable infill member for use in the construction system or improved construction system for block walls as defined in the first two aspects of the invention, or the method for forming a block wall matrix as defined in the preceding aspect of the present invention.

**Brief Description of the Drawings**

Figures 1A to 1E are drawings of prior art arrangements showing the use of a framing system, wherein:

Figure 1A is a cut away isometric view showing the positioning of the sill and jamb frame sections in a corner of the rectangular frame as mounted to a wall surround;

Figure 1B is a sectional view of a head frame section mounted to a wall surround showing a glass block correctly positioned therewith;

Figure 1C is a sectional view of a sill frame section mounted to a wall surround showing a glass block correctly positioned therewith with an interstitial end spacer adapted for use with a silicon binder;

Figure 1D is a sectional view of a jamb frame section mounted to a wall surround showing a glass block correctly positioned therewith with both a deformable infill member and an interstitial end spacer adapted for use with a silicon binder; and

Figure 1E is a cut away isometric view showing the positioning of the interstitial spacers upon the glass blocks with respect to the sill and jamb frame sections in a corner of the rectangular frame as mounted to a wall surround.

The remaining drawings illustrate one preferred embodiment of the invention described hereinafter with reference to these drawings, wherein:

Figure 2 is a cross-sectional view of the common basic configuration of a head, sill and jamb frame section in accordance with the preferred embodiment of the invention;

Figure 3 is a cut away isometric view showing the relative positioning of the sill infill and deformable infill members with respect to the sill and jamb frame sections of the present invention;

Figure 4 is a cross-sectional view of a rigid infill member in accordance with the preferred embodiment of the invention;

Figure 5 is a cross-sectional view of a flush fill member in accordance with the preferred embodiment of the invention;

Figure 6 is a cross-sectional view of the flush fill member engaged with a frame section to close the channel section thereof;

Figure 7 is a cross-sectional view of a snap-on infill member in accordance with the preferred embodiment;

Figure 8 is a cross-sectional view of the snap-on infill member engaged with the outer periphery of a frame section to close the same;

Figure 9 is a cross-sectional view of a frame section having both a flush fill member and snap-on infill member engaged respectively with the channel section and the outer periphery of a frame section to form a closed box member; and

Figures 10A to 10E are drawings of arrangements showing the use of the construction system in accordance with the preferred embodiment of the invention, wherein:

Figure 10A is a cut away isometric view showing the positioning of a sill and a jamb frame section in a corner of a rectangular frame as mounted to a wall surround with a rigid sill infill member in the sill frame section and a deformable infill member in the jamb frame section.

Figure 10B is a sectional view of a head frame section mounted to a wall surround showing a glass block correctly positioned therewith;

Figure 10C is a sectional view of a sill frame section mounted to a wall surround showing a glass block correctly positioned therewith with both a rigid sill infill member and an interstitial end spacer adapted for use with a silicon binder;

Figure 10D is a sectional view of a jamb frame section mounted to a wall surround showing a glass block correctly positioned therewith with both a deformable infill member and an interstitial end spacer adapted for use with a silicon binder; and

Figure 10E is a cut away isometric view showing the positioning of the interstitial spacers upon the glass blocks with respect to a sill and a jamb frame section in a corner of the rectangular frame as mounted to a wall surround with a rigid sill infill member in the sill frame section and a deformable infill member in the jamb frame section.

**Best Mode(s) for Carrying Out the Invention**

The preferred embodiment is directed towards an improved construction system for glass block walls using a rectangular frame, various types of infill members for performing particular spacing and finishing functions with respect to the rectangular frame and interstitial connectors or spacers to facilitate the accurate positioning of the glass blocks within the frame for subsequent binding with a binder mixture such as mortar or silicon.

As illustrated in Figure 2, the rectangular frame comprises a common basic frame section 11 that may form a sill frame section, a pair of jamb frame sections and a head frame section. In the present embodiment, the frame sections 11 are formed of an aluminium extrusion cut to prescribed lengths to fit the glass blocks therein. Each of the resultant frame sections are rebated and recessed at the corners to facilitate being interconnected to form the frame. Each frame section has a block-engaging portion 13 and an outer periphery 15 formed by opposing channel sections of respective configuration dedicated to the purpose of each. Moreover, the channel section of the block-engaging portion 13 is provided with a pair of

laterally spaced, co-extensive flanges 17 and an interconnecting web portion 19. The flanges are sufficiently spaced to accommodate the transverse extent of a glass block (not shown) for it to be seated endwise therein.

The inner faces of the flanges 17 are each provided with a retaining nodule 21 at the proximal end thereof, which serves a dual purpose that will be described in more detail later.

The channel section of the outer periphery 15 of the frame section 11 is similarly provided with a pair of laterally spaced, co-extensive outer flanges 23, oppositely extending of the flanges 17, albeit of lesser length, which are interconnected by the rear of the web portion 19. A further pair of laterally spaced, co-extensive intermediate flanges 25 is provided on the rear face of the web portion, intermediate the opposing flanges 17, one 25a of the pair being of corresponding length to the opposing flanges 23 and the other 25b of the pair being significantly longer.

Each of the flanges 23 and 25 are provided with transverse projections 27 extending perpendicularly therefrom at a prescribed distance from the rear face 29 of the interconnecting web portion 19. The projections 27a provided on each of the outer flanges 23 are inwardly directed at the distal ends of the flanges. The projections 27b on each of the intermediate flanges 25 are outwardly directed, opposite to the projection 27a of the adjacent outer flange 23 respective thereto. In the case of the one intermediate flange 25a, the transverse projection 27b thereof is at its distal end, whereas in the case of the other longer intermediate flange 25b, the transverse projection 27b thereof is intermediate the ends of the flange 25b, at a corresponding distance from the rear face 29 of the web portion 19 to the other projections 27.

The outer flanges 23 are also each provided with a medial transverse projection 31 extending perpendicularly inward therefrom medially between the distal transverse projections 27a and the rear face 29 of the web portion. The purpose of these projections 31 will be described in more detail later.

The portion of the longer intermediate flange 25b that projects distally beyond the transverse projection 27b thereof effectively forms a fin 33. The junction between the fin 33 and the transverse projection 27b is provided with a fracture line 35 along the full longitudinal extent of the longer intermediate flange 25b to facilitate breaking the fin 33 from the flange, making it co-terminus with the remaining flanges of the opposing channel section on the outer periphery 15 of the frame section. This is done to enable the outer periphery to be capped in situations where this may be desirable, in a manner that will be further described later.

A pair of longitudinally extending screw flutes 37 are also provided on the rear face 29 of the web portion 19, one flute interposed between adjacent outer and intermediate flange pairs, as shown in the drawings. The flutes 37 enable the frame sections to be fixed into position to not only form the rectangular frame but to fix the frame to the block wall surround by the use of tech screws or other suitable fixing device. The lengths of the frame sections are predetermined dependent upon the size of the block wall intended to be constructed and whether the frame section is to be used as a head, sill or jamb frame section. Due to the fact that only a whole number of standard sized glass blocks can be used to form a row or column of the wall matrix, and each of these rows and columns are spaced exactly according to the standard thickness of the particular type of interstitial connector or spacer used, the frame sections are modularised in length to ensure that the wall is correctly constructed.

The only difference other than length between the various frame sections is in the provision of weep holes (not shown) in the sill frame sections. These weep holes are punched in either the web portion 19 or a flange 17 adjacent the junction between the two at regularly spaced intervals longitudinally therealong on the intended weather-side of the frame, as is known in the art.

The various types of infill members of the construction system that perform spacing functions include a rigid infill member 39 and a deformable infill member 41 as illustrated in Figure 3 of the drawings. Both of these infill members are of the same thickness and are intended to be disposed within the sill and jamb frame sections respectively to reduce the depth of the channel sections thereof by a

predetermined magnitude for accommodating the interstitial end connectors or spacers as well as the confronting ends of the terminating glass blocks therein.

The rigid infill member 39 in the present embodiment is also formed from extruded aluminium. As shown in Figure 4, the rigid infill member 39 has a transverse web portion 43 and a plurality of laterally spaced, longitudinally extending legs 45 that are intermediately spaced between the opposing longitudinal edges 47 of the web portion. The legs 45 are of equal length and depend perpendicularly and co-extensively from one side of the web portion 41 so that the locus of the distal ends of the legs is planar and parallel to the web portion 41.

The transverse extent of the web portion 43 is marginally less than the transverse extent between the opposing flanges 23 of the frame section 11, allowing the rigid infill member to be wholly situated within the channel section of the block engaging portion 13 of a sill frame section when cut to the correct length, as shown in Figure 3 of the drawings.

The length of the legs 45 are of a predetermined height so that the rigid infill member 39 can be disposed within the channel section with the distal legs sitting upon the web portion 19 of the frame section and the web portion 43 of the infill member disposed at an elevated position at this predetermined height. The web portion 43 thus presents a bed within the channel section with sufficient remaining depth on which the interstitial end connectors or spacers may repose to accommodate the confronting ends of the foundation layer of glass blocks laid therein. The predetermined height of the infill member is precisely determined so that the confronting ends of the foundation layer of glass blocks just sit marginally within the confines of the channel section, concealing the interstitial connector or spacer and the infill member 39 and allowing the glass blocks to be sealed against the distal ends of the flanges 17, optimising the aesthetic appearance of the sides of the block.

Importantly, insofar as the functionality of the preferred embodiment is concerned, the outer legs 45a of the infill member 39 are inset from the opposing ends 47 of the web portion 43. This permits better drainage of fluid accumulated within the

inner channel section of the sill frame section through the weep holes, especially if the weep holes are located in the flanges 17, than if the outer legs were co-terminus with the opposing ends 47.

The deformable infill member 41 is formed of a resilient material, which in the present embodiment is polystyrene foam. The deformable infill member 41 is rectangular having a corresponding transverse extent to the web portion 19 of the frame section 11. Accordingly, when it is cut to the correct length, it can sit snugly within the channel section of a jamb frame section.

The deformable infill member 41 is also of substantially the same thickness as the rigid infill member 39 to present an elevated bed or surface within the channel section of a jamb frame section of the same depth as that provided by the rigid infill member 39 in a sill frame section. Thus the confronting ends of a terminating column of glass blocks can sit marginally within the confines of the channel section of a jamb frame section, concealing the interstitial connector or spacer and the infill member 41 therein and allowing the glass blocks to be sealed against the distal ends of the flanges 17, optimising the aesthetic appearance of the sides of the block.

The retaining nodules 21 perform an important function with respect to the positioning and retention of the deformable infill members 41. Moreover, the retaining nodules 21 are disposed a prescribed distance from the web portion 19 of the frame sections, this distance corresponding to or being marginally less than the prescribed height or thickness of the infill members 39 and 41. In this manner, the nodules 21 can frictionally engage and positively retain the opposing sides of the deformable infill members 41 in vertical juxtaposition with the web portions 19 of the jamb frame sections, whilst laying the glass blocks within the rectangular frame.

The various types of infill members of the construction system that perform finishing functions include a snap-on flush fill member 49 and a snap-on infill member 51, both of which are formed of aluminium extrusions.

As illustrated in Figures 5 and 6, the flush fill member 49 essentially comprises a U-shaped channel section having a pair of co-extensive legs 53 and an interconnecting web portion 55. The web portion 55 is of commensurate transverse extent to the channel section of the frame sections 11 and the transverse extent between the outside of the legs 53 is commensurate to the transverse extent between the inside of the flanges 17 of the frame sections. Consequently, a pair of laterally projecting outer flanges 57 is formed by the web portion 55 at opposing sides thereof, adjacent to the legs 53.

An outwardly flared clip 59 is provided at the distal end of each leg 53 with a rearwardly facing step 61 at the proximal end of the clip. The length of the legs 53 is designed so that the distance between the step 59 and the web portion 55 is commensurate to the distance between the distal ends of the flanges 17 and the inner step of the retaining nodules 21 of the frame sections 11.

A spacing nodule 63 is also provided on the outer face of each leg 49 at the proximal end thereof for supporting purposes.

By virtue of this configuration, as shown in Figure 6, a flush fill member 49 can be fully inserted into the inner channel section of the block engaging portion of a frame section 11, with the clips 59 snapping into position to engage and be positively retained by the retaining nodules 21 of the frame section. The spacing nodules 63 engage the inner sides of the flanges 17 at a position spaced from the distal ends of the legs 53 and thus help support the legs in position. In this manner, an inner channel section can be closed off, where desired, presenting a closed box finish for aesthetic purposes.

As shown in Figures 7 and 8, the snap-on infill 51 is substantially similar to the flush fill member 49. except that it is modified to interconnect with and close off the outer channel section of the periphery engaging portion 15 of a frame section 11. Moreover, the snap-on infill member 51 comprises a pair of legs 65 terminated with outwardly flared clips 67 and an interconnecting web portion 69.

The transverse extent of the web portion 69 is commensurate to the transverse extent of the web portion 19 of a frame section, and the transverse extent between the outside of the legs 65 is commensurate to the transverse extent between the opposing inner terminal ends of the distal transverse projections 27a of the outer flanges 23 of a frame section. Consequently, a pair of laterally projecting outer flanges 71 is formed by the web portion 69 at opposing sides thereof, adjacent to the legs 65. Furthermore, the length of the legs 65 is such that the distance between the rear step of the clips 67 and the web portion 69 is commensurate to the distance between the rear proximal edge of the medial transverse projections 31 and the rear surface 29 of the web portion 19 of a frame section.

By virtue of this configuration, as shown in Figure 8, the outer channel section of the periphery engaging portion of a frame section can be closed by breaking off the outwardly projecting fin 33 at the fracture line 35 and fully inserting the snap-on infill member 51 into the outer channel section. When fully inserted, the clips 67 will snap into position to engage and be positively retained by the medial transverse projections 31 of the frame section. In this manner, an outer channel section can be closed off, where desired, presenting a closed box finish for aesthetic purposes.

By using both the flush fill member 49 and the snap-on infill member 51 on the same frame section, a complete box channel member 71 may be formed as shown in Figure 9 of the drawings. This adds significantly to the versatility of the construction system.

Now describing the method by which a glass block wall matrix may be constructed using the construction system described above, initially the various frame sections are selected according, or cut, to their prescribed lengths forming the glass block wall matrix of the requisite size. The sill frame section is positioned horizontally in a wall surround to form a base for the frame in known manner. The jamb frame sections are then positioned vertically at either end of the sill frame section and are screwed into position, interconnecting the sill and jamb frame sections and tying the jamb frames into the wall surround, again in known manner. The head

frame is finally positioned horizontally between the tops of the jamb frame sections and screwed into position interconnecting the head and jamb frame sections to provide the head for the frame and complete the formation of the rectangular frame.

A rigid sill infill member 39 is then selected, or cut, to a length commensurate with the length of the inner channel section of the sill frame section. It is then situated within the channel section to form an elevated bed on which a glass block may sit and be retained within the sill frame section endwise.

Deformable infill members 41 are then cut to a length commensurate with the remaining length of the inner channel sections of the jamb frame sections and are then pressed into position within these channel sections of each jamb frame section. This position corresponds with the rear surface of the deformable infill members 41 being juxtaposed against the transverse web portions 19 of each channel section, past the retaining nodules 21 of the flanges 17 so that the retaining nodules positively retain the deformable infill members in position, as shown in Figure 3.

The foundation layer of glass blocks is then positioned along the rigid sill infill member 39 within the sill frame section using interstitial end connectors or spacers and binder, as appropriate, in known manner. The interstitial end connectors or spacers rest upon the sill infill member 39, spacing the bottom confronting ends of the foundation layer of glass blocks from the sill infill member. The interstitial end connectors or spacers at opposing confronting ends of the row of foundation glass blocks engage the outer surface of the deformable infill members 41, spacing these confronting ends from the deformable infill members. In this manner, the foundation layer of glass blocks is accurately and precisely accommodated within the entire length of the channel section between the deformable infill members 41 reposing within the jamb frame sections.

Successive rows of glass blocks are then laid upon the foundation layer with interstitial connectors or spacers and binder as appropriate to maintain the accurate and precise positioning of the blocks and thus form a rectangular wall

matrix. The confronting ends of the terminating blocks at either end of each of these rows continues to indirectly engage the deformable infill members via end interstitial connectors or spacers disposed thereon, in known manner.

The final uppermost row of terminating blocks is specially laid so that the last block to be inserted in the wall is intermediate the terminating blocks at either end of this head row. The uppermost confronting ends of the terminating blocks are disposed marginally within the channel section of the head frame section so that it can be retained between the flanges 17 thereof and be spaced from the web portion 19 to leave a gap without any deformable infill member being disposed therein. This gap allows for convenient manoeuvring of the terminating blocks for correct positioning thereof upon the preceding row.

Use of the construction system according to the above method in arrangements corresponding to Figures 1A to 1E of the prior art, is shown in Figures 10 A to 10E of the accompanying drawings.

It should be appreciated that the scope of this invention is not limited to the particular embodiment described above.

**The Claims Defining the Invention are as Follows**

1. A construction system for block walls comprising:

a rectangular frame including corresponding head, sill and jamb frame sections that may be interconnected to form the frame within which the blocks may be laid in a rectangular matrix spaced by interstitial connectors or spacers and interconnected by a binder;

the frame sections having a block engaging portion comprising a channel section having a pair of flanges provided on opposed sides of the block engaging portion thereof and an interconnecting transverse web portion;

the pair of flanges being spaced apart a distance sufficient to accommodate the transverse extent of a block seated therebetween in an endwise position.

2. An improved construction system for block walls including a rectangular frame having a head, sill and a pair of jamb frame sections that may be interconnected to form the frame within which the blocks may be laid in a rectangular matrix spaced by interstitial connectors or spacers and interconnected by a binder, the frame sections including a block engaging portion comprising a channel section having a pair of flanges provided on opposed sides of the block engaging portion thereof and an interconnecting transverse web portion, the pair of flanges being spaced apart a distance sufficient to accommodate the transverse extent of a block seated therebetween in an endwise position;

the improvement comprising:

each of the head, sill and jamb frame sections being of a basic common configuration;

wherein the flanges of all frame sections are of the same length and are sufficiently long to accommodate and conceal both an infill member and an interstitial end connector or spacer of a prescribed thickness for spacing the confronting end of a terminating block from the web portion of the frame section.

3. A construction system for block walls as claimed in claim 1 or 2, wherein the length of said pair of flanges is the same for all of said frames.

4. A construction system for block walls as claimed in any one of the preceding claims, wherein said pair of flanges has a retaining nodule formed on the inner side of each flange thereof at the proximal ends thereof, confronting the other.

5. A construction system for block walls as claimed in any one of the preceding claims, wherein the frames have a set of positioning projections on the periphery engaging portion thereof.

6. A construction system for block walls as claimed in any one of the preceding claims, including a rigid infill member for sitting in the channel section of the sill frame so as to present an elevated bed within the channel section on which a block may sit and be retained within the frame endwise; the rigid infill member comprising a transverse web portion and a plurality of laterally spaced, longitudinally extending legs that depend from one side of the web portion co-extensively, intermediate the opposing longitudinal edges of the web portion.

7. A construction system for block walls as claimed in any one of the preceding claims, including a deformable infill member for sitting in the channel section of the jamb frames so as to form a resilient spacer to accommodate relative movement between the blocks and the frame in situ.

8. A construction system for block walls as claimed in claim 7, wherein the deformable infill member is formed of polystyrene foam and is retained in position by said retaining nodules.

9. A construction system for block walls as claimed in any one of the preceding claims, including a flush fill member for closing the channel section of a frame section.

10. A construction system for block walls as claimed in claim 9, wherein the flush fill member is itself a channel section having a pair of legs and an interconnecting web portion of commensurate transverse extent to the channel section of a frame section.

11. A construction system for block walls as claimed in claim 10, wherein the flush fill member has clips disposed at the distal ends of the legs thereof to engage and be positively retained by the retaining nodules provided on the inner side of the flanges of the frame section to close the channel section thereof.

12. A construction system for block walls as claimed in claim 10 or 11, wherein the flush fill member has a spacing nodule provided on the outer face of each of the legs at the proximal ends thereof to positively engage and support the legs within the confines of the channel section of the frame section against the flanges thereof.

13. A method for forming a block wall matrix, comprising:

interconnecting and mounting a head, sill and a pair of jamb frame sections to form a rectangular frame, the frame sections all being of corresponding shape and having a block engaging portion disposed inwardly of the frame to accommodate the laying of blocks therein to form a block wall matrix, the block engaging portion comprising a channel section having a pair of flanges and an interconnecting transverse web portion, the pair of flanges being spaced apart a distance sufficient to accommodate the transverse extent of a block seated therebetween in an endwise position and of a

length sufficient to accommodate and conceal both an infill member and an interstitial end connector or spacer, both of prescribed thicknesses, for spacing the confronting end of a terminating block from the web portion of the frame section;

locating a rigid infill member within the channel section on which a block may sit and be retained within the frame endwise, the rigid infill member comprising a transverse web portion and a plurality of laterally spaced, longitudinally extending legs that depend from one side of the web portion co-extensively, intermediate the opposing longitudinal edges of the web portion;

locating deformable infill members in the channel sections of each jamb frame section and pressing them into juxtaposition against the transverse web portions of each channel section, past the retaining nodules of the flanges so that the retaining nodules positively retain the deformable infill members in position;

laying the foundation blocks along the rigid infill member within the sill frame section with the interstitial end connectors or spacers and binder as appropriate to accurately and precisely accommodate the entire length of the channel section between the deformable infill members reposing at either end of the sill frame section, within the jamb frame sections, so that the confronting ends of the terminating blocks at either end of the foundation layer indirectly engage the deformable infill members via end interstitial connectors or spacers disposed thereon;

successively laying rows of blocks on the foundation layer with interstitial connectors or spacers and binder as appropriate to maintain the accurate and precise positioning of the blocks to form a rectangular matrix, the confronting ends of the terminating blocks at either end of these rows continuing to indirectly engage the deformable infill members via end interstitial connectors or spacers disposed thereon; and

laying the final uppermost row of terminating blocks so that the last block to insert is intermediate the terminating blocks at either end of the row, whereby the uppermost confronting ends of the terminating blocks are disposed marginally within the channel section of the head frame sections to be retained between the flanges and spaced from the web portion thereof to leave a gap without any deformable infill member being disposed therein, the gap allowing for convenient manoeuvring of the terminating blocks for correct positioning thereof upon the preceding row.

14. A block wall matrix produced by a method for forming a block wall matrix as claimed in claim 13.

15. A frame section, rigid infill member or deformable infill member for use in the construction system or improved construction system for block walls as claimed in any one of claims 1 to 12, or the method for forming a block wall matrix as claimed in claim 13.

16. A construction system or improved construction system for block walls substantially as herein described with reference to the accompanying drawings.

17. A method for forming a block wall matrix substantially as herein described.

18. A frame section, rigid infill member or deformable infill member substantially as described herein with reference to the accompanying drawings as appropriate.

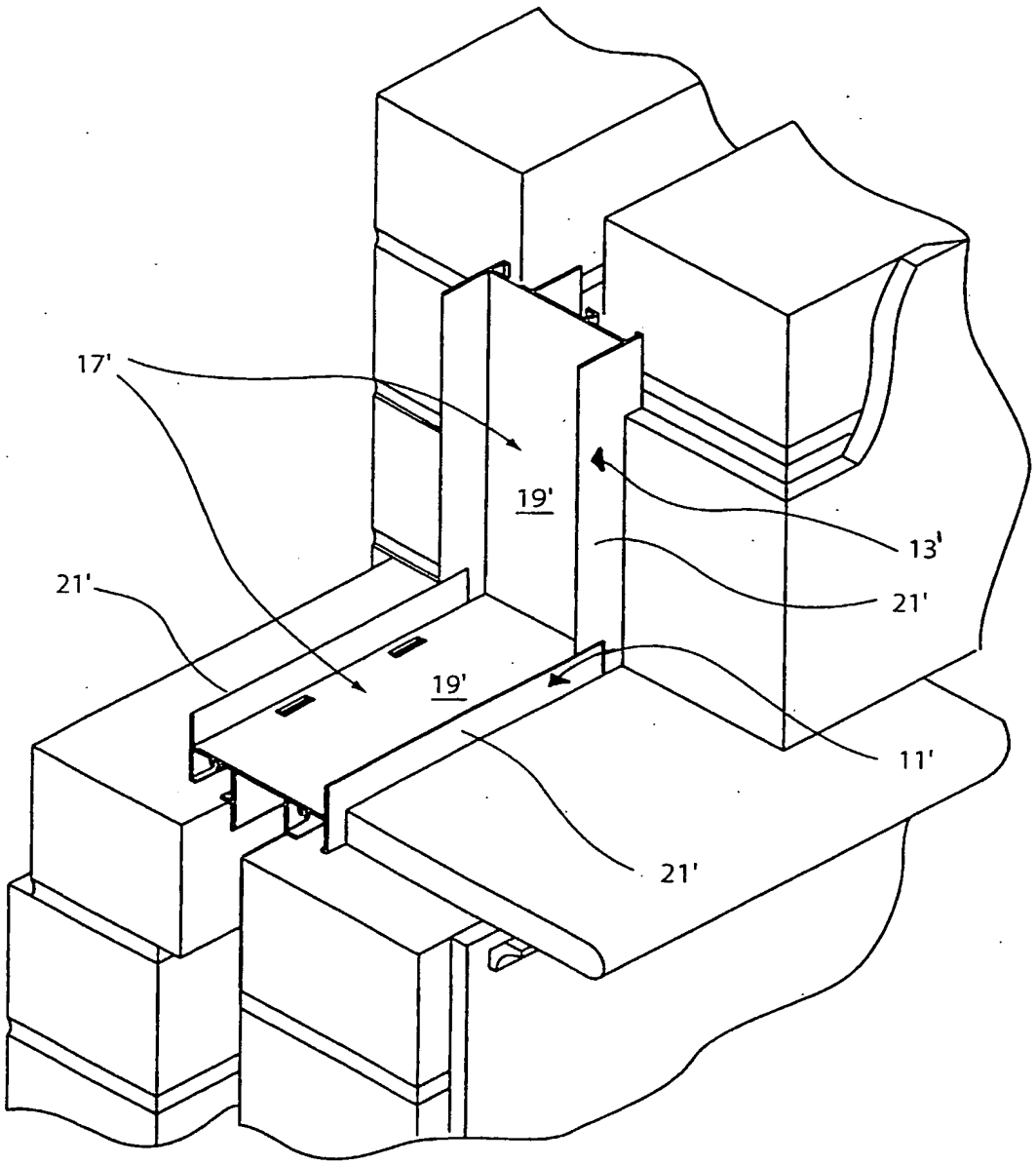


FIG 1A

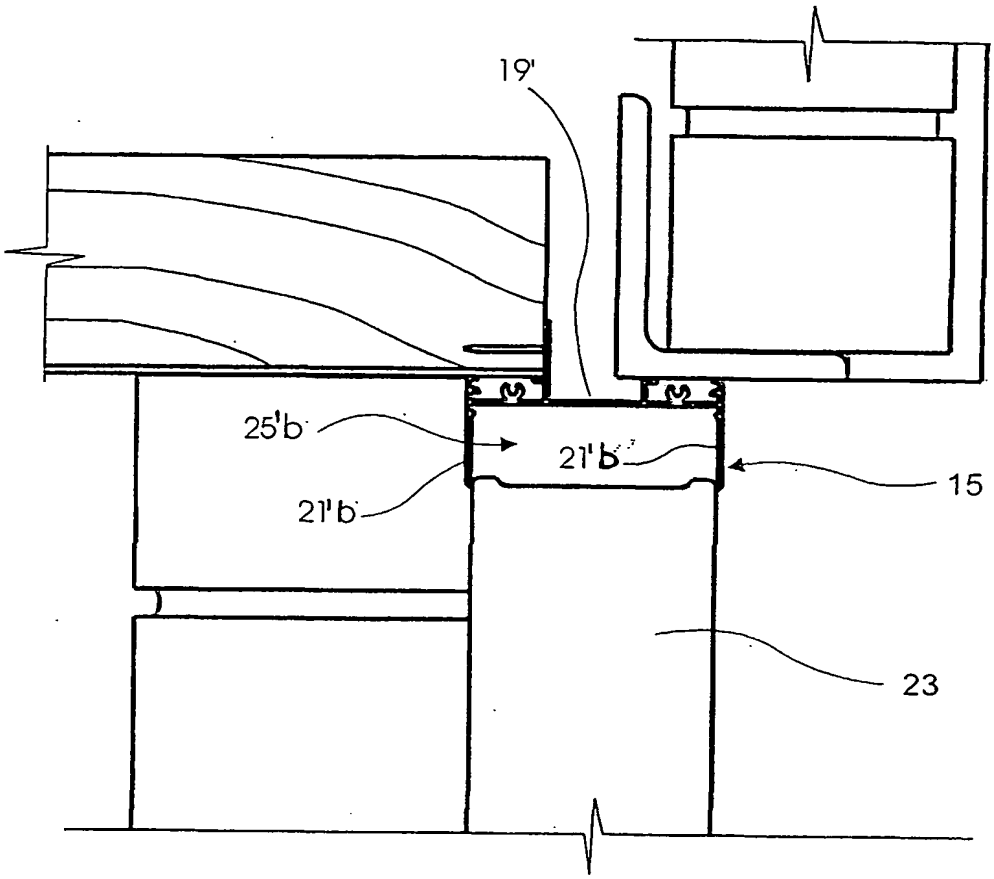


FIG 1B

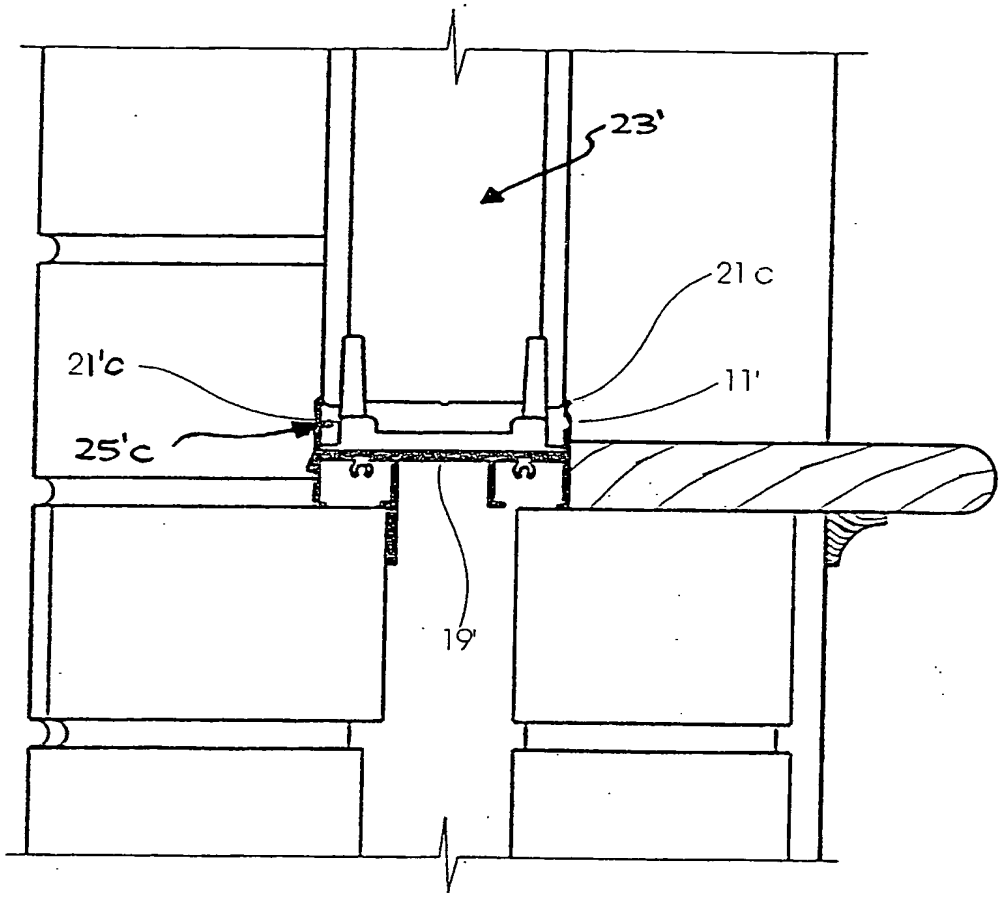


FIG 1C

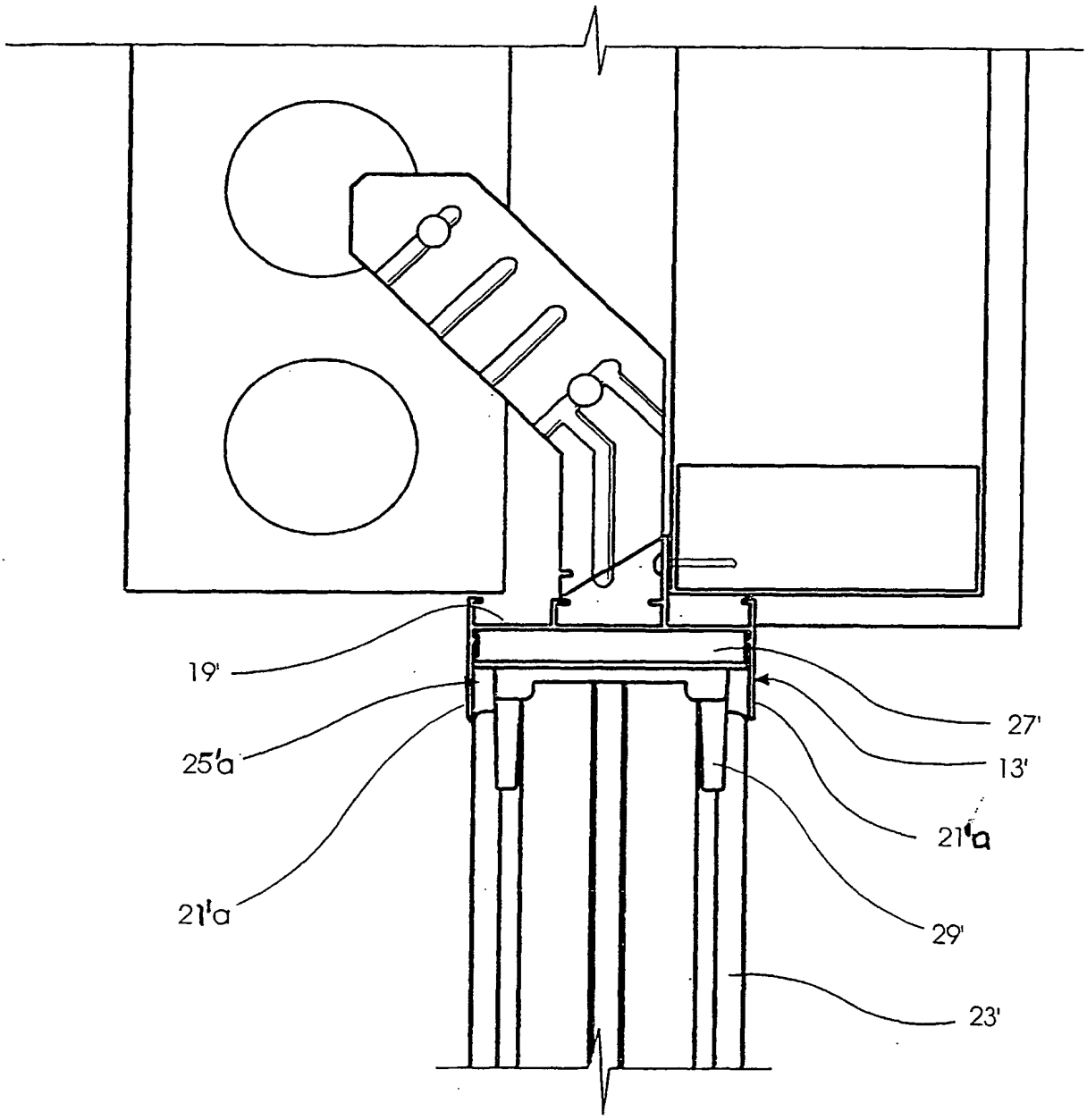


FIG 1D

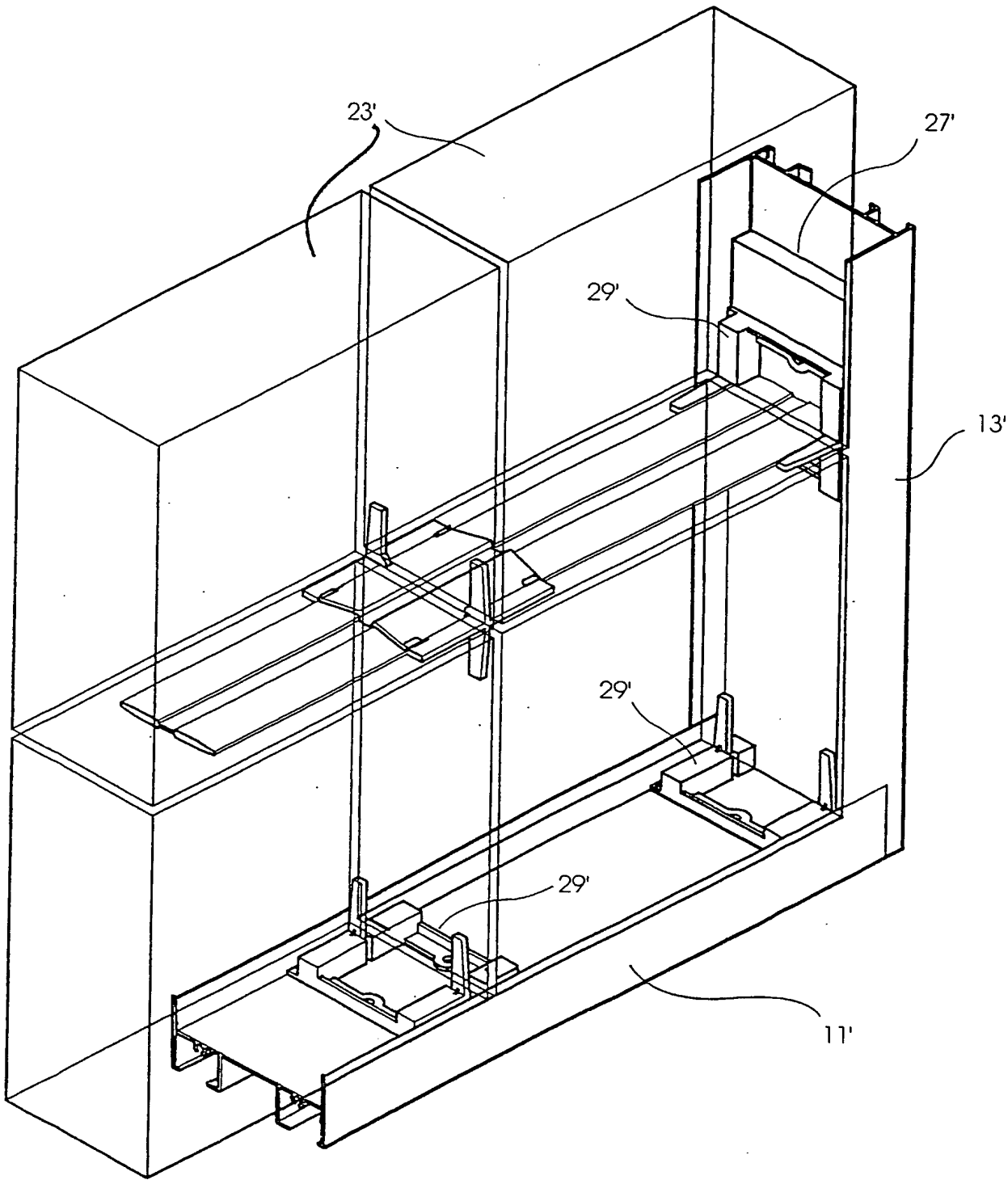


FIG 1E

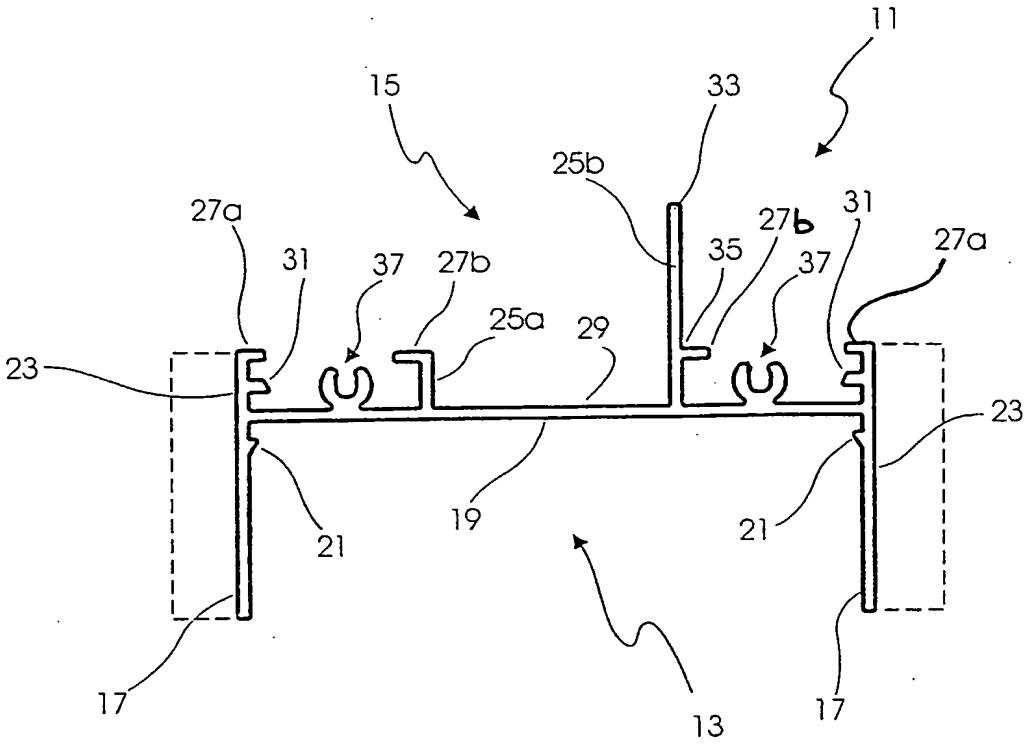
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FIG 2

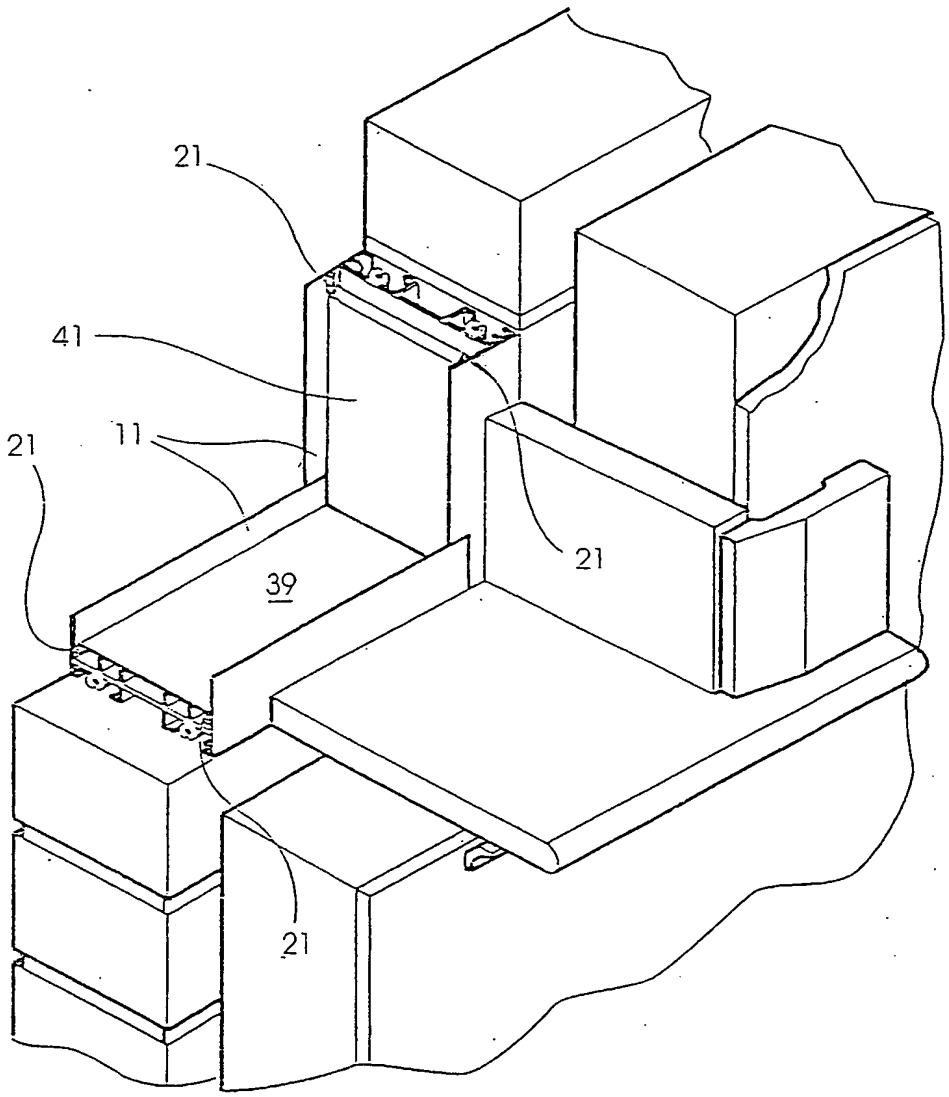


FIG 3

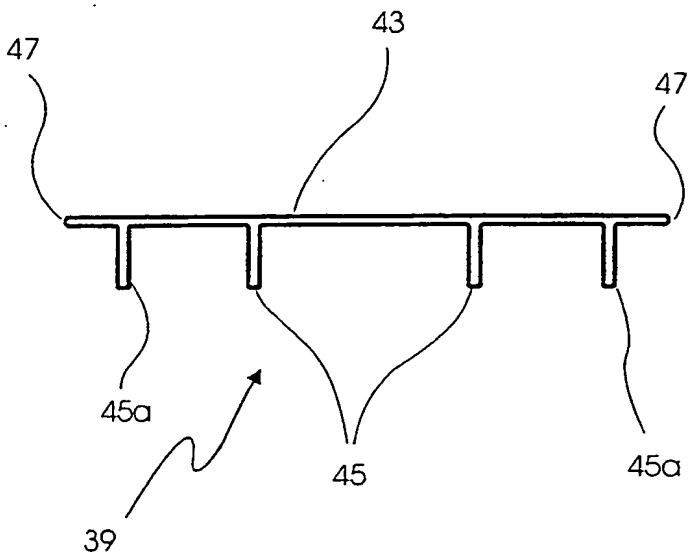


FIG 4

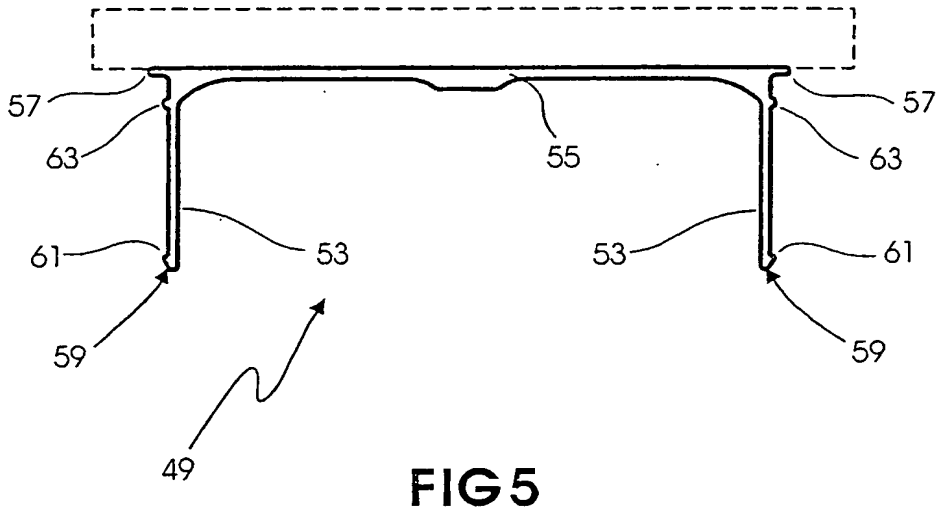


FIG 5

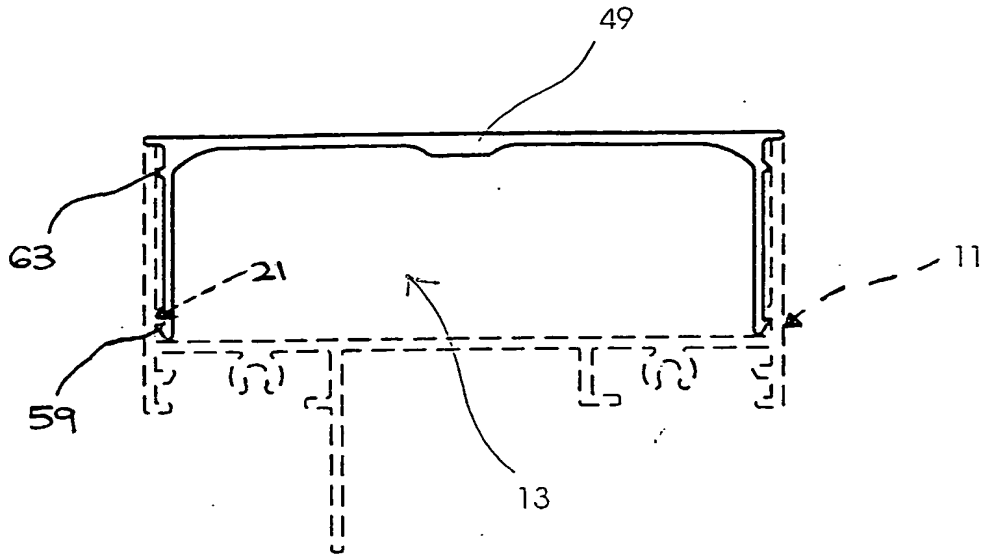


FIG 6

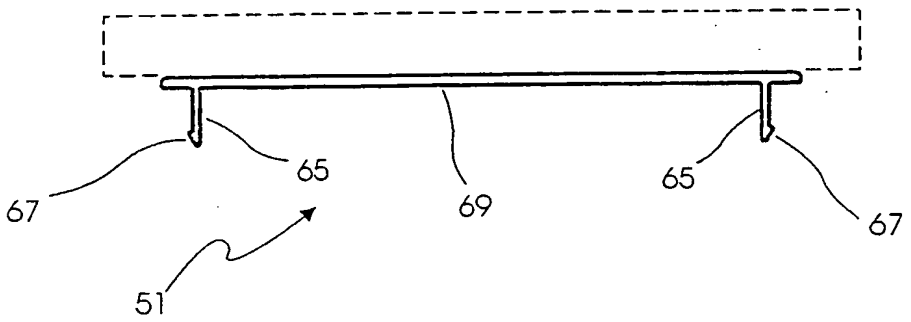


FIG 7

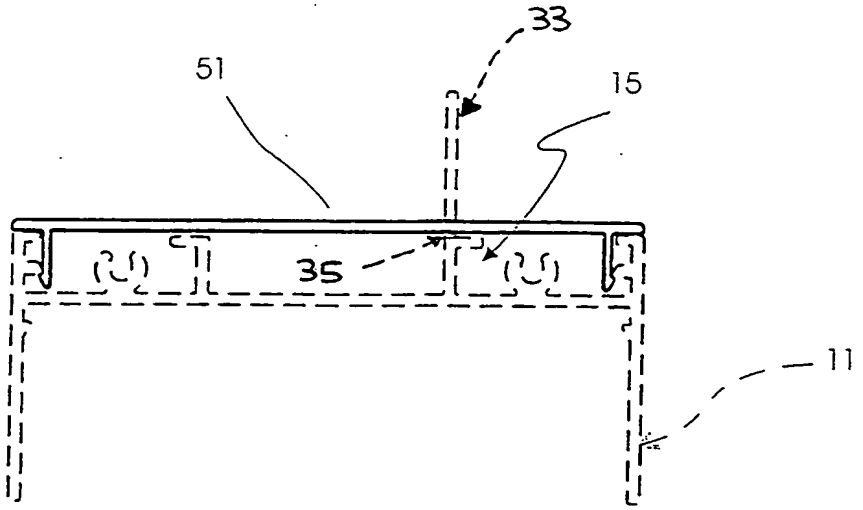


FIG8

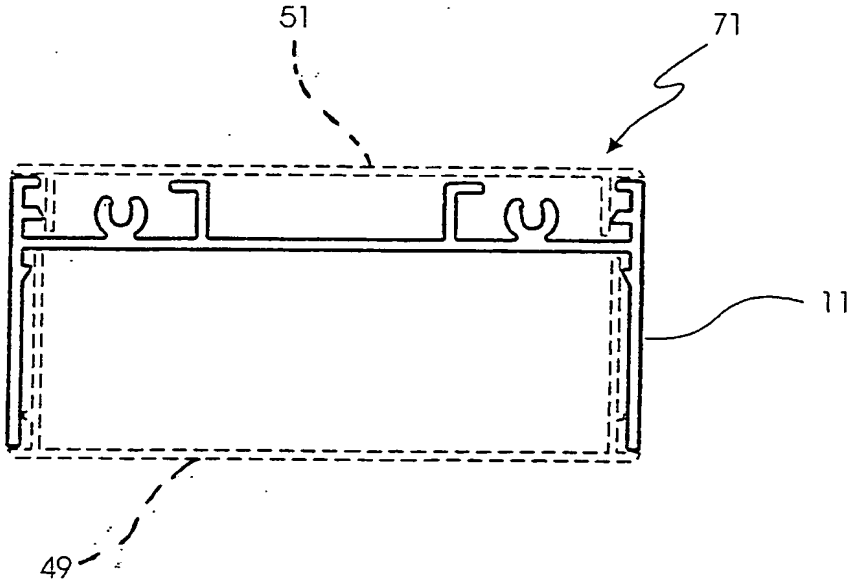


FIG9

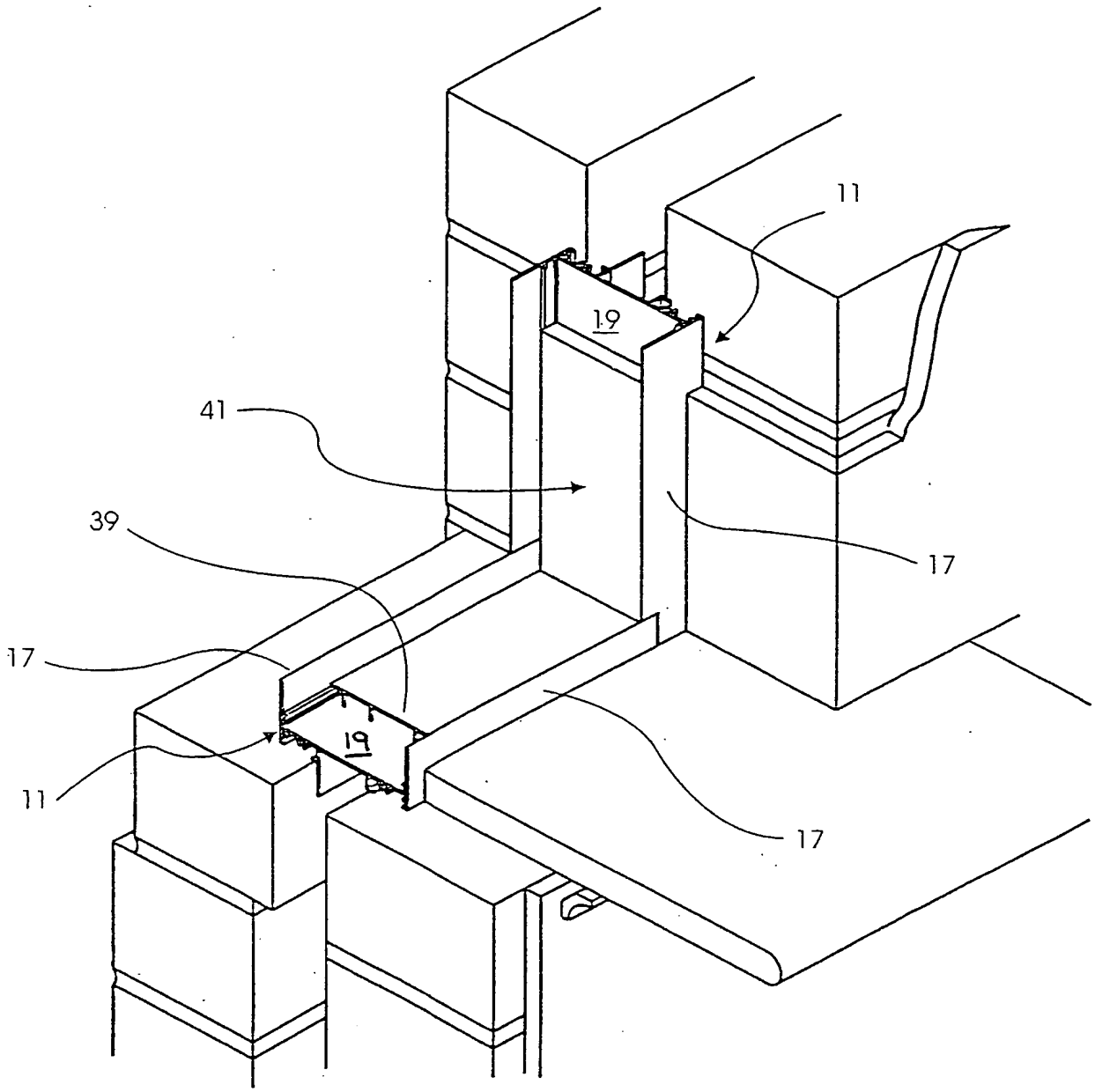


FIG 10A

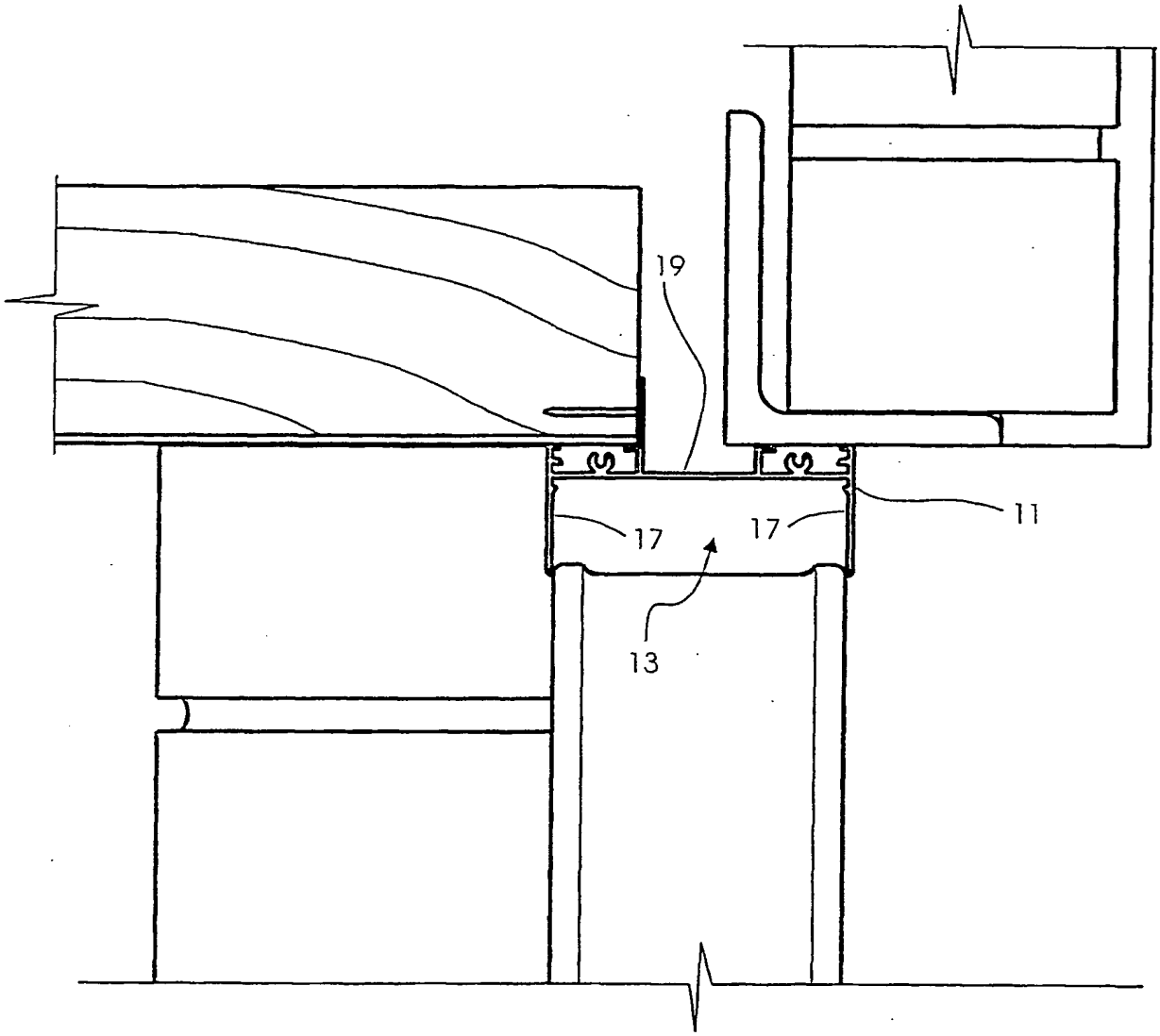


FIG 10B

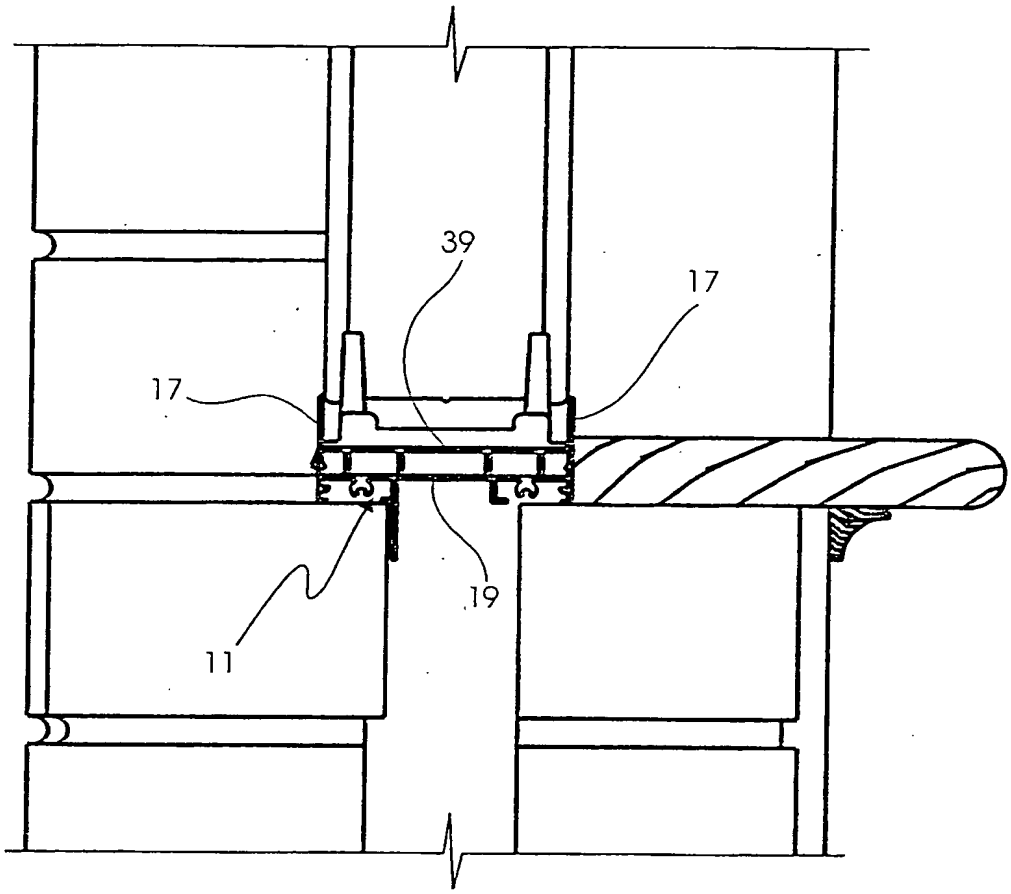


FIG 10C

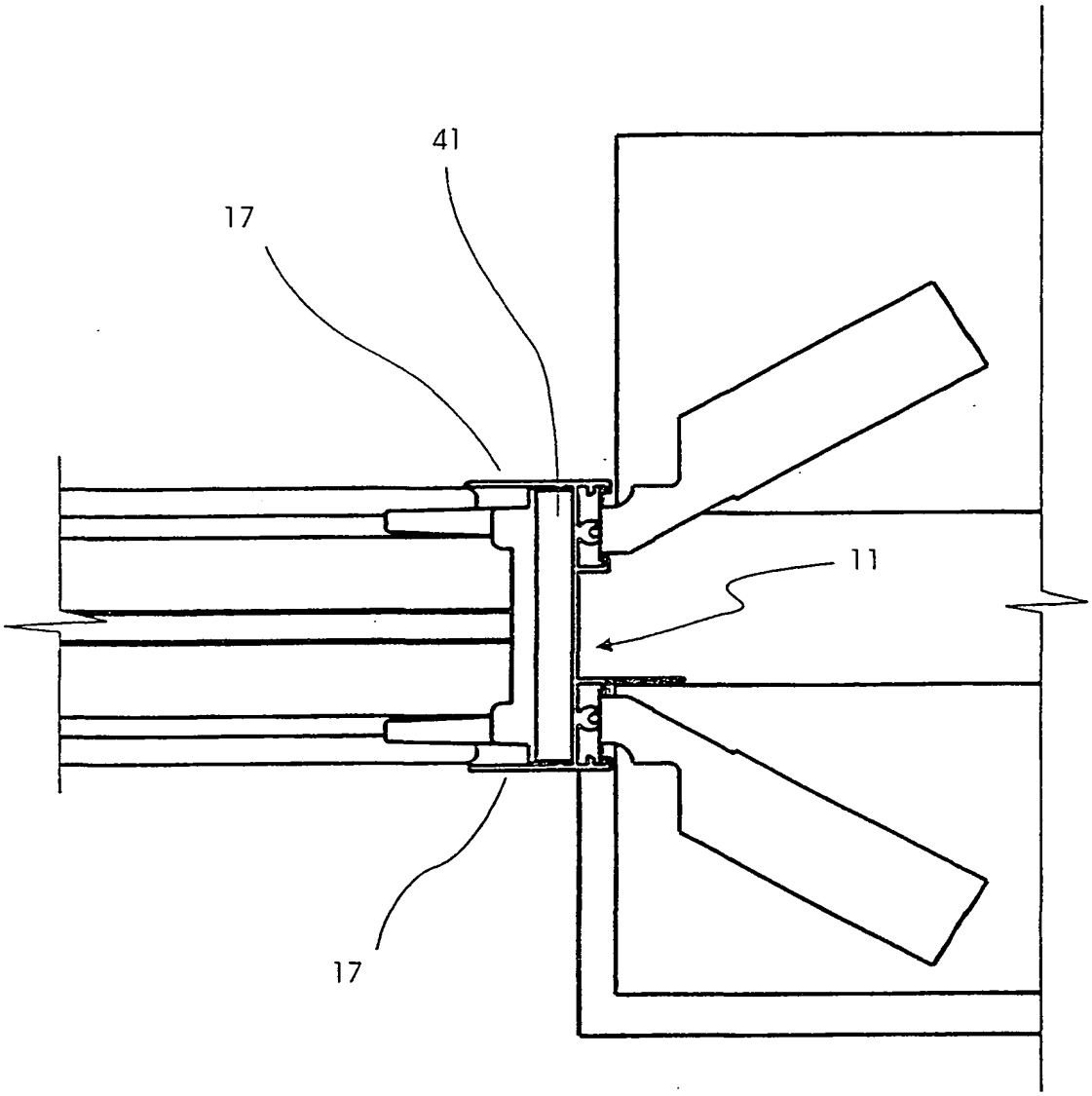


FIG 10D

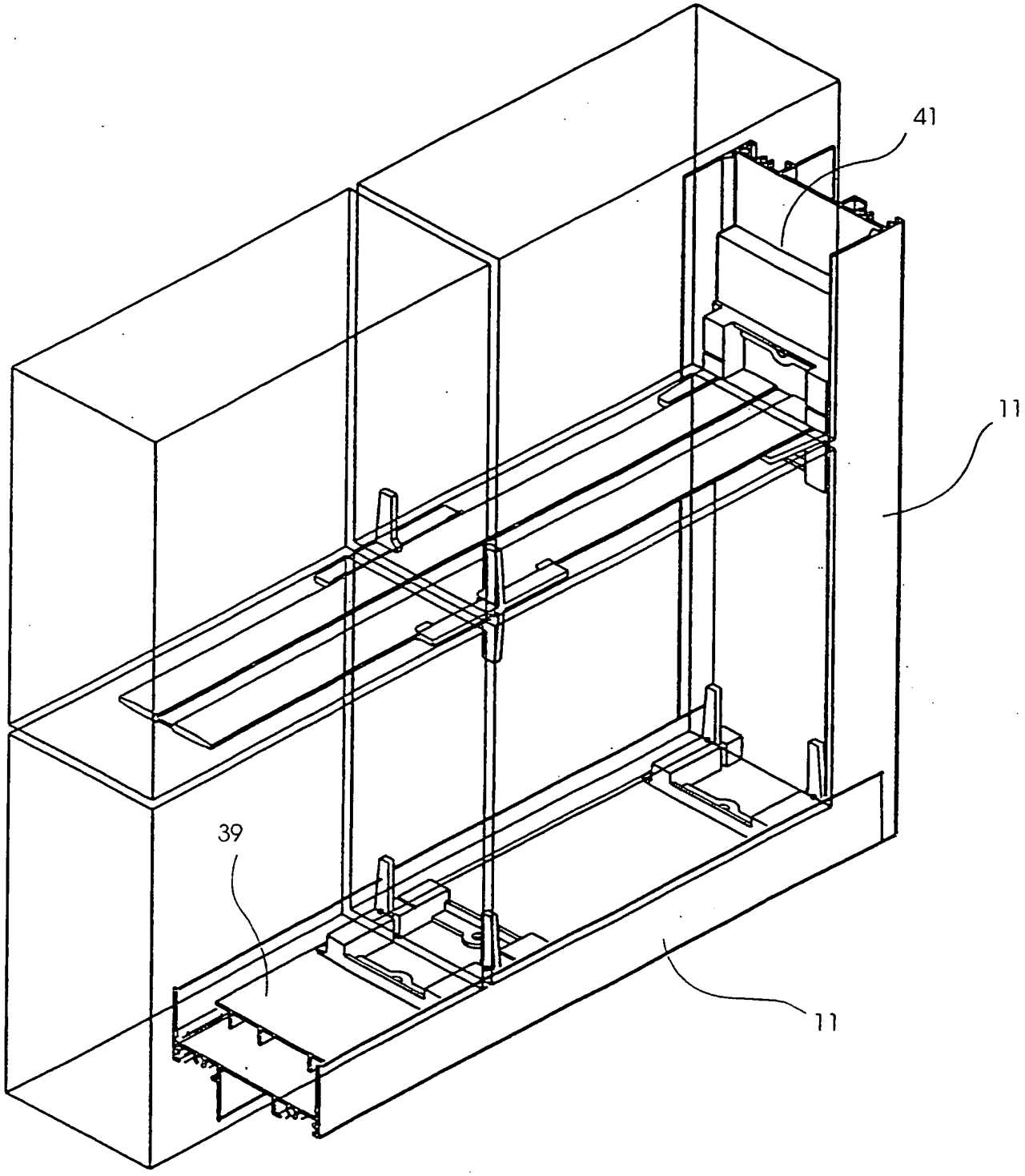


FIG 10E

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU02/00793

**A. CLASSIFICATION OF SUBJECT MATTER**

Int. Cl. [7]: E04C 1/42, E04B 2/76, E06B 1/14

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)
REFER ELECTRONIC DATA BASE CONSULTED BELOW

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC E04C 1/42, E04B 2/76, E06B 1/14

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
DWPI & keywords: fram, block, brick, glas, wall, channel, hat, U, C, E04C1/-,3/-, E04B2/-,1/-,E06B1/-, nodul, tang, tab, protrusion, protrud etc.

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 4843772 A (LISA et al) 4 July 1989<br>See figures. | 1-4 |
| X | US 4916876 A (SCHUYLER) 17 April 1990<br>See figures. | 1-3 |
| X | US 4986048 A (McMARLIN) 22 January 1991<br>See figures. | 1-3 |

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 12 August 2002 | 21 AUG 2002 |
| Name and mailing address of the ISA/AU<br>AUSTRALIAN PATENT OFFICE<br>PO BOX 200, WODEN ACT 2606, AUSTRALIA<br>E-mail address: pct@ipaustralia.gov.au<br>Facsimile No. (02) 6285 3929 | Authorized officer<br>**JAGDISH BOKIL**<br>Telephone No : (02) 6283 2371 |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU02/00793

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | JP 09067881 A (NIPPON ELECTRIC GLASS CO) 11 March 1997<br>See figures. | 1,5 |
| X | CA 2013448 A (BALLSTADT) 30 September 1990<br>See figures. | 1-3,5,7 |

Form PCT/ISA/210 (continuation of Box C) (July 1998)

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
**PCT/AU02/00793**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent Document Cited in Search Report | | Patent Family Member | | | | | |
|---|---|---|---|---|---|---|---|
| US | 4843772 | NIL | | | | | |
| US | 4916876 | NIL | | | | | |
| US | 4986048 | CA | 2033839 | EP | 437375 | JP | 4221154 |
| | | AU | 69297/91 | | | | |
| JP | 9567881 | NIL | | | | | |
| CA | 2013448 | US | 5014471 | | | | |

END OF ANNEX